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SECTION 06100  
ROUGH CARPENTRY

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## SECTION 06100

## ROUGH CARPENTRY

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN FOREST &amp; PAPER ASSOCIATION (AF&amp;PA)

AF&PA T01 (1991; Supple 1993; Addenda Apr 951997; Supple T02) National Design Specification for Wood Construction

AF&PA T11 (1988) Manual for Wood Frame Construction

## AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4 (1995) Basic Hardboard

AHA A194.1 (1985) Cellulosic Fiber Board

## AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

AITC TC Manual (1994) Timber Construction Manual

AITC 109 (1990) Standard for Preservative Treatment of Structural Glued Laminated Timber

AITC 111 (1979) Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection

AITC 190.1 (1992) Wood Products - Structural Glued Laminated Timber

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A208.1(1999) Particleboard Mat Formed Woods

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 307 (1997) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

ASTM C 79/C 79M (1997) Treated Core and Nontreated Core Gypsum Sheathing Board

ASTM C 208 (1995) Cellulosic Fiber Insulating Board

ASTM C 516	(1980; R 1996) Vermiculite Loose Fill Thermal Insulation
ASTM C 518	(1998) Steady-State Heat Flux Measurements and Thermal Transmission Properties By Means of the Heat Flow Meter Apparatus
ASTM C 549	(1981; R 1995) Perlite Loose Fill Insulation
ASTM C 552	(1991) Cellular Glass Thermal Insulation
ASTM C 553	(1992) Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
ASTM C 578	(1995) Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 591	(1994) Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C 612	(1993) Mineral Fiber Block and Board Thermal Insulation
ASTM C 665	(1998) Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
ASTM C 726	(1993) Mineral Fiber Roof Insulation Board
ASTM C 739	(1997) Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation
ASTM C 764	(1994) Mineral Fiber Loose-Fill Thermal Insulation
ASTM C 1136	(1995) Flexible, Low Permeance Vapor Retarders for Thermal Insulation
ASTM C 1177/C 1177M	(1996) Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C 1289	(1998) Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM D 2898	(1996) Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
ASTM D 3498	(1993) Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
ASTM E 84	(1998e1) Surface Burning Characteristics of Building Materials
ASTM E 96	(1995) Water Vapor Transmission of Materials

ASTM E 154 (1996) Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

ASTM F 547 (1977; R 1990) Definitions of Terms Relating to Nails for Use with Wood and Wood-Base Materials

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C2 (1995) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes

AWPA C9 (1997) Plywood - Preservative Treatment by Pressure Processes

AWPA C20 (1996) Structural Lumber Fire-Retardant Pressure Treatment

AWPA C27 (1996) Plywood - Fire-Retardant Pressure Treatment

AWPA M4 (1996) Standard for the Care of Preservative-Treated Wood Products

AWPA P5 (1997) Standards for Waterborne Preservatives

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

APA EWS R540C (1996) Builder Tips Proper Storage and Handling of Glulam Beams

APA EWS T300C (1997) Glulam Connection Details

APA PRP-108 (1994; Rev 1997) Performance Standards and Policies for Structural-Use Panels (Form No. E445Q)

CALIFORNIA REDWOOD ASSOCIATION (CRA)

CRA RIS-01-SS (1997) Standard Specifications for Grades of California Redwood Lumber

CODE OF FEDERAL REGULATIONS (CFR)

16 CFR 1209 Interim Safety Standard for Cellulose Insulation

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1 (1996) Voluntary Product Standard - Construction and Industrial Plywood

DOC PS 2 (1992) Performance Standards for Wood-Based Structural-Use Panels

FACTORY MUTUAL ENGINEERING AND RESEARCH (FM)

FM LPD 1-49	(1995) Loss Prevention Data Sheet - Perimeter Flashing
NATIONAL HARDWOOD LUMBER ASSOCIATION (NHLA)	
NHLA Rules	(1994) Rules for the Measurement & Inspection of Hardwood & Cypress
NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)	
NELMA Grading Rules	(1997) Standard Grading Rules for Northeastern Lumber
SOUTHERN CYPRESS MANUFACTURERS ASSOCIATION (SCMA)	
SCMA Specs	(1986; Supple No. 1, Aug 1993) Standard Specifications for Grades of Southern Cypress
SOUTHERN PINE INSPECTION BUREAU (SPIB)	
SPIB Rules	(1994; Supple 8 thru 11) Standard Grading Rules for Southern Pine Lumber
TRUSS PLATE INSTITUTE (TPI)	
TPI 1	(1995) National Design Standard for Metal Plate-Connected Wood Truss Construction and Commentary and Appendices to TPI 1
TPI Bklet HIB	(1991) Handling, Installing & Bracing Metal Plate Connected Wood Trusses
WEST COAST LUMBER INSPECTION BUREAU (WCLIB)	
WCLIB Std 17	(1996; Supples VII(A-E), VIII(A-C)) Grading Rules for West Coast Lumber
WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)	
WWPA Grading Rules	(1995; Supple Nos. 1 thru 5) Western Lumber Grading Rules 95

## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

### SD-01 Data

Structural Wood Members; GA.

Design analysis and calculations of structural laminated members, fabricated wood trusses, and other fabricated structural members showing design criteria used to accomplish the applicable analysis.

Product Installations; FIO.

List containing name and location of successful installation of similar type of fabricated structural members specified herein.

#### SD-04 Drawings

Structural Wood Members; GA. Installation of Framing; GA.

Drawings of structural laminated members, fabricated wood trusses, engineered wood joists and rafters, and other fabricated structural members indicating materials, shop fabrication, and field erection details; including methods of fastening.

Nailers and Nailing Strips; GA.

Drawings of field erection details, including materials and methods of fastening nailers in conformance with Factory Mutual wind uplift rated systems specified in other Sections of these specifications.

#### SD-13 Certificates

Grading and Marking; FIO.

Manufacturer's certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material not normally grade marked meet the specified requirements. Certificate of Inspection for grade marked material by an American Lumber Standards Committee (ALSC) recognized inspection agency prior to shipment.

Insulation; FIO.

Certificate attesting that the cellulose, perlite, glass and mineral fiber, glass mat gypsum roof board, polyurethane, or polyisocyanurate insulation furnished for the project contains recovered material, and showing an estimated percent of such recovered material.

### 1.3 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition, stored off ground in fully covered, well ventilated areas, and protected from extreme changes in temperature and humidity. Laminated timber shall be handled and stored in accordance with AITC 111 or APA EWS R540C.

## PART 2 PRODUCTS

### 2.1 LUMBER AND SHEATHING

#### 2.1.1 Grading and Marking

##### 2.1.1.1 Lumber Products

Solid sawn and finger-jointed lumber shall bear an authorized gradestamp or grademark recognized by ALSC, or an ALSC recognized certification stamp, mark, or hammerbrand. Surfaces that are to be exposed to view shall not bear grademarks, stamps, or any type of identifying mark. Hammer marking will be permitted on timbers when all surfaces will be exposed to view.

##### 2.1.1.2 Fabricated Structural Members



Wood trusses shall be fabricated in accordance with TPI 1. Laminated timbers shall be marked with a quality mark indicating conformance to AITC 190.1. Engineered wood joists and rafters shall be fabricated using an approved quality control system to meet specified requirements.

#### 2.1.1.3 Plywood and Other Sheathing Products

Materials shall bear the grademark or other identifying marks indicating grades of material and rules or standards under which produced, including requirements for qualifications and authority of the inspection organization. Except for plywood and wood structural panels, bundle marking will be permitted in lieu of marking each individual piece. Surfaces that are to be exposed to view shall not bear grademarks or other types of identifying marks.

#### 2.1.2 Sizes

Lumber and material sizes shall conform to requirements of the rules or standards under which produced. Unless otherwise specified, lumber shall be surfaced on four sides. Unless otherwise specified, sizes indicated are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

#### 2.1.3 Treatment

Exposed areas of treated wood that are cut or drilled after treatment shall receive a field treatment in accordance with AWPA M4. Items of all-heart material of cedar, cypress, or redwood will not require preservative treatment, except when in direct contact with soil. Except as specified for all-heart material of the previously mentioned species, the following items shall be treated:

- a. Wood members in contact with or within 455 mm 18 inches of soil.
- b. Wood members in contact with water.
- c. Wood members exposed to the weather including those used in builtup roofing systems or as nailing strips or nailers over fiberboard or gypsum-board wall sheathing as a base for wood siding.
- d. Wood members set into concrete regardless of location, including flush-with-deck wood nailers for roofs.
- e. Wood members in contact with concrete that is in contact with soil or water or that is exposed to weather.

##### 2.1.3.1 Lumber and Timbers

Lumber and timbers shall be treated in accordance with AWPA C2 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

- a. 4 kg per cubic meter (0.25 pcf) 0.25 pcf intended for above ground use.
- b. 6.4 kg per cubic meter (0.40 pcf) 0.40 pcf intended for ground contact and fresh water use.

##### 2.1.3.2 Plywood

Plywood shall be treated in accordance with AWPA C9 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

- a. 4 kg per cubic meter (0.25 pcf) 0.25 pcf intended for above ground use.
- b. 6.4 kg per cubic meter (0.40 pcf) 0.40 pcf intended for ground contact and fresh water use.

#### 2.1.4 Moisture Content

At the time lumber and other materials are delivered and when installed in the work their moisture content shall be as follows:

- a. Treated and Untreated Lumber Except Roof Planking: 100 mm 4 inches or less, nominal thickness, 19 percent maximum. 125 mm 5 inches or more, nominal thickness, 23 percent maximum in a 75 mm 3 inch perimeter of the timber cross-section.
- b. Roof Planking: 15 percent maximum.
- c. Materials Other Than Lumber: In accordance with standard under which product is produced.

#### 2.1.5 Fire-Retardant Treatment

Fire-retardant treated wood shall be pressure treated in accordance with AWPA C20 for lumber and AWPA C27 for plywood. Material use shall be defined in AWPA C20 and AWPA C27 for Interior Type A and B and Exterior Type. Treatment and performance inspection shall be by an independent and qualified testing agency that establishes performance ratings. Each piece or bundle of treated material shall bear identification of the testing agency to indicate performance in accordance with such rating. Treated materials to be exposed to rain wetting shall be subjected to an accelerated weathering technique in accordance with ASTM D 2898 prior to being tested for compliance with AWPA C20 or AWPA C27. Items to be treated are as required by the Task Order.

#### 2.1.6 Structural Wood Members

Species and grades shall be as listed in AF&PA T01. Structural lumber used in fabrication of bolted trusses and other fabricated structural members for engineered uses, except laminated members, shall have allowable design values as required by the Task Order. Joists, rafters including trussed type, decking, and headers shall have design values, as required by the Task Order, in bending for repetitive member uses. Design of members and fastenings shall conform to AITC TC Manual. Other stress graded or dimensioned items such as blocking, carriages, and studs shall be standard or No. 2 grade except that studs may be Stud grade.

##### 2.1.6.1 Trussed Rafters

As an option to standard rafters, trussed rafters may be provided. The design shall be as indicated. Connections shall be made with light-metal plate-connectors. Light-metal-plate-connected wood trusses shall be designed and fabricated in conformance with TPI 1. When new plate configuration is proposed, load testing of trusses is required and shall conform to Appendix D of TPI 1.

#### 2.1.6.2 Structural Glued Laminated Members

Members shall conform to AITC 190.1 with allowable design values as required by the Task Order. Adhesives used in fabrication shall meet the requirements of dry use service. Members shall be industrial appearance grade, architectural appearance grade, sealed with a penetrating sealer treated with preservative, and individually wrapped, bundle wrapped as required by the Task Order. Preservative treatment shall be as required by the Task Order in accordance with AITC 109. Members shall be complete with hardware for joining laminated members and for their connection to other construction.

#### 2.1.6.3 Engineered Wood Joists and Rafters

As an option to standard rafters, engineered wood joists and rafters may be provided. Engineered wood rafters shall be wood I-joists manufactured in accordance with a nationally recognized code and installed in accordance with the manufacturer's recommendations.

#### 2.1.7 Sheathing

Sheathing shall be fiberboard, gypsum board, plywood, wood structural panels, or wood for wall sheathing; and plywood, wood structural panels, or wood for roof sheathing.

##### 2.1.7.1 Fiberboard

Fiberboard shall conform to ASTM C 208, Type IV, Grade 2, Structural Grade, or AHA A194.1, Type IV, Grade 2 asphalt impregnated or asphalt coated to be water-resistant but vapor permeable.

##### 2.1.7.2 Gypsum Sheathing Board

Glass mat gypsum sheathing shall conform to ASTM C 79/C 79M and ASTM C 1177.

Gypsum board shall conform to ASTM C 79/C 79M, 13 mm thick (1/2 inch thick), 1/2 inch thick, 1200 mm 4 feet wide with straight edges for supports 400 mm 16 inches on center without corner bracing of framing or for supports 600 mm 24 inches on center with corner bracing of framing; 600 mm wide 2 feet wide with V-tongue and groove edges for supports 400 or 600 mm 16 or 24 inches on center with corner bracing of framing.

##### 2.1.7.3 Plywood

Plywood shall conform to DOC PS 1, APA PRP-108 or DOC PS 2, Grade C-D or sheathing grade with exterior glue. Sheathing for roof and walls without corner bracing of framing shall have a span rating of 16/0 or greater for supports 400 mm 16 inches on center and a span rating of 24/0 or greater for supports 600 mm 24 inches on center.

##### 2.1.7.4 Wood Structural Panels

Panels shall meet the qualification requirements of APA PRP-108 or DOC PS 2 for rated sheathing, Exposure 1 or Structural I rated sheathing, Exposure 1. Sheathing for roofs or walls without corner bracing of framing shall have a span rating of 16/0 or greater for supports 400 mm 16 inches on center and shall have a span rating of 24/0 or greater for supports 600 mm 24 inches on center.

#### 2.1.7.5 Wood

Species and grade shall be in accordance with TABLE I at the end of this section. Wall sheathing shall be 25 mm 1 inch thick for supports 400 or 600 mm 16 or 24 inches on center without corner bracing of framing provided sheathing is applied diagonally. Roof sheathing shall be 25 mm 1 inch thick for supports 400 or 600 mm 16 or 24 inches on center.

#### 2.1.8 Subflooring

##### 2.1.8.1 Plywood

Plywood shall conform to DOC PS 1, APA PRP-108 or DOC PS 2; Grade C-D or Sheathing grade with exterior glue for uses not otherwise specified; Grade C-D or sheathing grade with exterior glue for reception of underlayment or wood flooring; underlayment grade with exterior glue, or C-C (plugged) exterior grade for use as a combination subfloor-underlayment under resilient flooring. Minimum span rating for subflooring shall be 24/16 for supports 400 mm 16 inches on center, and 48/24 for supports 600 mm 24 inches on center. Minimum span rating for combination subfloor-underlayment shall be 16/0 for supports 400 mm 16 inches on center and 24/0 for supports at 600 mm 24 inches on center.

##### 2.1.8.2 Wood Structural Panels

Rated wood structural panels shall be qualified for subflooring or combination subfloor-underlayment under APA PRP-108 or DOC PS 2. Subflooring shall be rated sheathing with a span rating of 24/16 or greater for supports 400 mm 16 inches on center and shall have span rating of 48/24 or greater for supports 600 mm 24 inches on center. Combination subfloor-underlayment shall have a span rating of 16/0 or greater for supports 400 mm 16 inches on center and shall have span rating for 24/0 or greater for supports 600 mm 24 inches on center.

##### 2.1.8.3 Wood

Species and grade shall be in accordance with TABLE I at the end of this section, 25 mm 1 inch thick, center-matched, shiplapped, or square edge.

#### 2.1.9 Underlayment

Underlayment shall conform to one of the following:

##### 2.1.9.1 Hardboard

AHA A135.4 service class, sanded one side, 6 mm (1/4 inch) 1/4 inch thick, 1200 mm 4 feet wide.

##### 2.1.9.2 Particleboard

ANSI A208.1, Grade 1-M-1, 6 mm (1/4 inch) 1/4 inch thick, 1200 x 1200 mm. 4 x 4 feet.

##### 2.1.9.3 Plywood

Plywood shall conform to DOC PS 1, underlayment grade with exterior glue, or C-C (Plugged) exterior grade 9 mm 11/32 inch thick, 1200 mm 4 feet wide.

#### 2.1.10 Shear Wall Panels

Panels used in shear wall construction shall be of the span rating and thickness shown and shall be plywood conforming to DOC PS 1 or DOC PS 2, Grade C-D with exterior glue, Grade C-D, Structural I; or wood structural panels conforming to APA PRP-108 or DOC PS 2, rated sheathing, Exposure I, Structural I rated sheathing, Exposure 1 as required by the Task Order.

#### 2.1.11 Roof Decking

Roof decking shall be commercial or select grade with minimum design value of 7.6 MPa 1100 psi in bending. Decking shall be 50 mm 2 inches thick with single tongue and groove; V-jointed, matched and dressed. As an option, fabricated laminated lumber decking with interlocking tongue and groove joints may be provided.

#### 2.1.12 Miscellaneous Wood Members

##### 2.1.12.1 Nonstress Graded Members

Members shall include bridging, corner bracing, furring, grounds, and nailing strips. Members shall be in accordance with TABLE I for the species used. Sizes shall be as follows unless otherwise shown:

Member	Size mm (inch)
Bridging	25 x 75 (1 x 3) or 25 x 100 (1 x 4) for use between members 50 x 300 (2 x 12) and smaller; 50 x 100 (2 x 4) for use between members larger than 50 x 300 (2 x 12).
Corner bracing	25 x 100 (1 x 4).
Furring	25 (1) x 75 (3)
Grounds	Plaster thickness by 38.
Nailing strips	25 x 75 (1 x 3) or 25 x 100 (1 x 4) when used as shingle base or interior finish, otherwise 50 mm (2 inch) stock.

Member	Size (inch)
Bridging	1 x 3 or 1 x 4 for use between members 2 x 12 and smaller; 2 x 4 for use between members larger than 2 x 12.
Corner bracing	1 x 4.
Furring	1 x 3.
Grounds	Plaster thickness by 1-1/2.
Nailing strips	1 x 3 or 1 x 4 when used as shingle base or interior finish, otherwise 2 inch stock.

#### 2.1.12.2 Wood Bumpers

Bumpers shall be of the species and grade in accordance with TABLE II at the end of this section, size as shown.

#### 2.1.12.3 Sill Plates

Sill plates shall be standard or number 2 grade.

#### 2.1.12.4 Blocking

Blocking shall be standard or number 2 grade.

#### 2.1.12.5 Rough Bucks and Frames

Rough bucks and frames shall be straight standard or number 2 grade.

### 2.2 ACCESSORIES AND NAILS

Markings shall identify both the strength grade and the manufacturer. Accessories and nails shall conform to the following:

#### 2.2.1 Anchor Bolts

ASTM A 307, size as indicated, complete with nuts and washers.

#### 2.2.2 Bolts: Lag, Toggle, and Miscellaneous Bolts and Screws

Type, size, and finish best suited for intended use. Finish options include zinc compounds, cadmium, and aluminum paint impregnated finishes.

#### 2.2.3 Clip Angles

Steel, 5 mm (3/16 inch) 3/16 inch thick, size best suited for intended use; or zinc-coated steel or iron commercial clips designed for connecting wood members.

#### 2.2.4 Expansion Shields

Type and size best suited for intended use.

#### 2.2.5 Joist Hangers

Steel or iron, zinc-coated, size to fit members where used, sufficient strength to develop the full strength of supported member, complete with any special nails required.

#### 2.2.6 Metal Bridging

Optional to wood bridging; zinc-coated steel, size and design to provide rigidity equivalent to specified wood bridging.

#### 2.2.7 Nails and Staples

ASTM F 547, size and type best suited for purpose; staples shall be as recommended by the manufacturer of the materials to be joined. For sheathing and subflooring, length of nails shall be sufficient to extend 25 mm 1 inch into supports. In general, 8-penny or larger nails shall be used for nailing through 25 mm 1 inch thick lumber and for toe nailing 50 mm 2

inch thick lumber; 16-penny or larger nails shall be used for nailing through 50 mm 2 inch thick lumber. Nails used with treated lumber and sheathing shall be galvanized. Nailing shall be in accordance with the recommended nailing schedule contained in AF&PA T11. Where detailed nailing requirements are not specified, nail size and spacing shall be sufficient to develop an adequate strength for the connection. The connection's strength shall be verified against the nail capacity tables in AF&PA T01. Reasonable judgement backed by experience shall ensure that the designed connection will not cause the wood to split. If a load situation exceeds a reasonable limit for nails, a specialized connector shall be used.

#### 2.2.8 Timber Connectors

Unless otherwise specified, timber connectors shall be in accordance with TPI 1, APA EWS T300C or AITC TC Manual.

### 2.3 INSULATION

Thermal resistance of insulation shall be not less than the R-values shown.

R-values shall be determined at 24 degrees C 75 degrees F in accordance with ASTM C 518. Insulation shall contain the highest practicable percentage of recovered material which has been recovered or diverted from solid waste, but not including material reused in a manufacturing process. Where two materials have the same price and performance, the one containing the higher recovered material content shall be provided. Insulation shall be the standard product of a manufacturer and factory marked or identified with manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Materials containing more than one percent asbestos will not be allowed.

#### 2.3.1 Batt or Blanket

##### 2.3.1.1 Glass Fiber Batts and Rolls

Glass fiber batts and rolls shall conform to ASTM C 665, Type I unfaced insulation, Type II kraft faced insulation or Type III foil faced insulation, Class A or B, having a UL rating of 25 or 50 and a smoke developed rating of 150 or less when tested in accordance with ASTM E 84 as required by the Task Order. Insulation shall have a 0.25 mm (10 mil) 10 mil thick, white, puncture resistant woven-glass cloth with vinyl facing on one side. Width and length shall suit construction conditions.

##### 2.3.1.2 Mineral Fiber Batt

Mineral fiber batt shall conform to ASTM C 665, Type I unfaced insulation, Type II kraft faced insulation, Class C or Type III foil faced insulation Class C as required by the Task Order.

##### 2.3.1.3 Mineral Fiber Blanket

Mineral fiber blanket shall conform to ASTM C 553, Type I, Class 6. Blankets shall be sized to suit construction conditions, resilient type for use below and above ambient temperature to 195 degrees C. 350 degrees F. Blankets shall have a factory applied vapor-barrier facing on one side with 50 mm 2 inch nailing tabs on both edges. Vapor barriers shall be fire retardant, high vapor transmission, and aluminum foil laminated to crepe paper type conforming to ASTM C 1136, Type II. Nominal density shall be 12 kg per cubic meter. 0.75 pcf.

### 2.3.2 Loose Fill or Granular Fill

#### 2.3.2.1 Vermiculite

Vermiculite shall conform to ASTM C 516, Type II.

#### 2.3.2.2 Perlite

Perlite shall conform to ASTM C 549, Type II with minimum recovered material content of 23 percent by weight of core material.

#### 2.3.2.3 Mineral Fiber

Mineral fiber shall conform to ASTM C 764, Type I or II as required by the Task Order. Blown-in mineral fiber insulation shall conform to ASTM C 764, Type I, Category 1, one percent or less loss on ignition or Category 2, 12 percent or less loss on ignition as required by the Task Order.

#### 2.3.2.4 Cellulosic or Wood Fiber

Cellulosic or wood fiber shall conform to ASTM C 739 or 16 CFR 1209 with minimum recovered material content of 75 percent by weight of core material.

### 2.3.3 Sill Sealer

Mineral wool, 25 mm 1 inch thick and compressible to 0.8 mm, 1/32 inch, width of sill, designed to perform as an air, dirt, and insect seal in conformance with ASTM C 665, Type I.

### 2.3.4 Rigid Insulation

#### 2.3.4.1 Polystyrene Board

Polystyrene board shall be extruded and conform to ASTM C 578, Type IV.

#### 2.3.4.2 Polyurethane or Polyisocyanurate Board

Polyurethane or polyisocyanurate board shall have a minimum recovered material content of 9 percent by weight of core material in the polyurethane or polyisocyanurate portion. Unfaced preformed polyurethane shall conform to ASTM C 591. Faced polyisocyanurate shall conform to ASTM C 1289.

#### 2.3.4.3 Glass Fiber or Insulation Board

Glass mat gypsum roof board shall conform to ASTM C 1177/C 1177M, flame spread 0, smoke developed 0, psi 500, water resistant.

Glass fiber or insulation board shall conform to ASTM C 612, Type 1A with a minimum recovered material content of 6 percent by weight of glass fiber core material. For floors receiving a vinyl finish flooring, a separate layer of fully-sanded underlayment shall be installed as provided for above over combination subfloor-underlayment panels.

#### 2.3.4.4 Mineral Fiber Block and Board

Mineral fiber block and board shall conform to ASTM C 612 or ASTM C 726 with a minimum recovered material content of 5 percent by weight of mineral fiber core material.



#### 2.3.4.5 Cellular Glass

Cellular glass shall conform to ASTM C 552.

#### 2.4 VAPOR RETARDER

Vapor retarder shall be polyethylene sheeting conforming to ASTM E 154 or other equivalent material. Vapor retarder shall have a maximum vapor permeance rating of 29 ng per Pa per second per square meter (0.5 perms) 0.5 perms as determined in accordance with ASTM E 96, unless otherwise specified.

#### 2.5 AIR INFILTRATION BARRIER

Air infiltration barrier shall be building paper meeting the requirements of ASTM C 1136, Type IV, style optional or a tear and puncture resistant olefin building wrap (polyethylene or polypropylene) with a moisture vapor transmission rate of 125 g per square meter per 24 hours 125 g per square meter per 24 hours in accordance with ASTM E 96, Desiccant Method at 23 degrees C or with a moisture vapor transmission rate of 670 g per square meter per 24 hours 670 g per square meter per 24 hours in accordance with ASTM E 96, Water Method at 23 degrees C.

### PART 3 EXECUTION

#### 3.1 INSTALLATION OF FRAMING

##### 3.1.1 General

General framing shall be in accordance with AF&PA T11. Members shall be closely fitted, accurately set to required lines and levels, and rigidly secured in place. Members shall be framed for passage of ducts. Members shall be cut, notched, or bored in accordance with applicable requirements of AF&PA T01 for the passage of pipes, wires, or conduits. Rafters, purlins, and joists shall be set with crown edge up. Framing shall be kept at least 50 mm 2 inches away from chimneys and 100 mm 4 inches away from fireplace backwalls. When joists, beams, and girders are placed on masonry or concrete, a wood base plate shall be positioned and leveled with grout. The joist, beam, or girder shall then be placed on the plate. When joists, beams, and girders are set into masonry or concrete, a pocket shall be formed into the wall. The joist, beam, or girder shall then be placed into the pocket and leveled with a steel shim.

##### 3.1.2 Structural Members

Members shall be adequately braced before erection. Members shall be aligned and all connections completed before removal of bracing. Individually wrapped members shall be unwrapped only after adequate protection by a roof or other cover has been provided. Scratches and abrasions of factory-applied sealer shall be treated with two brush coats of the same sealer used at the factory.

##### 3.1.3 Partition and Wall Framing

Unless otherwise shown, studs shall be spaced 400 mm 16 inches on centers. Studs shall be doubled at openings. Unless otherwise indicated, headers for openings shall be made of two pieces of stud material set on edge or solid lumber of equivalent size, and corners shall be constructed of not less than three full members. End studs of partitions abutting concrete or

masonry shall be anchored thereto with expansion bolts, one near each end of each stud and at intermediate intervals of not more than 1200 mm. 4 feet.

Plates of partitions resting on concrete floors shall be anchored in place with expansion bolts, one near each end of each piece and at intermediate intervals of not more than 1800 mm 6 feet between bolts. In lieu of expansion bolts, anchoring into concrete may be accomplished with powder-driven threaded studs of suitable type and size and spaced at 900 mm 3 feet on center. Walls and load bearing partitions shall be provided with double top plates with members lapped at least 600 mm 2 feet and well spiked together.

#### 3.1.4 Floor (Ceiling) Framing

Except where otherwise indicated joists shall have bearings not less than 100 mm 4 inches on concrete or masonry and 40 mm 1-1/2 inches on wood or metal. Joists, trimmers, headers, and beams framing into carrying members at the same relative levels shall be carried on joist hangers. Joists shall be lapped and spiked together at bearings or butted end-to-end with scab ties at joint and spiked to plates. Openings in floors shall be framed with headers and trimmers. Headers carrying more than two tail joists and trimmers supporting headers carrying more than one tail joist shall be doubled, unless otherwise indicated. Joists shall be doubled under partitions parallel with floor joists. Joists built into masonry shall be provided with a beveled fire cut so that the top of the joist does not enter the wall more than 25 mm 1 inch or standard steel wall bearing boxes]. Engineered wood joists shall be installed in accordance with distributor's instructions.

#### 3.1.5 Roof Framing or Rafters

Tops of supports or rafters shall form a true plane. Valley, ridge, and hip members shall be of depth equal to cut on rafters where practicable, but in no case less than depth of rafters. Valleys, hips, and ridges shall be straight and true intersections of roof planes. Necessary crickets and watersheds shall be formed. Rafters, except hip and valley rafters, shall be spiked to wall plate and to ceiling joists with no less than three 8-penny nails or bolted by angles as required by the Task Order. Rafters shall be toe-nailed to ridge, valley, or hip members with at least three 8-penny nails. Rafters shall be braced to prevent movement until permanent bracing, decking or sheathing is installed. Hip and valley rafters shall be secured to wall plates by clip angles. Openings in roof shall be framed with headers and trimmers. Unless otherwise indicated, headers carrying more than two rafters and trimmers supporting headers carrying more than one rafter shall be double. Hip rafters longer than the available lumber shall be butt jointed and scabbed. Valley rafters longer than the available lumber shall be double, with pieces lapped not less than 1200 mm 4 feet and well spiked together. Trussed rafters shall be installed in accordance with TPI Bklet HIB. Engineered wood joists shall be installed in accordance with distributor's instructions.

#### 3.1.6 Stair Framing

Stair framing members shall be well spiked together. Rough carriages shall be cut to exact shape required to receive finish treads and risers. Risers shall be of uniform height, and treads shall be of uniform width except as otherwise shown. Trimmers, blocking, and other framing necessary for support of finish treads, risers, newels, and railing shall be provided.

#### 3.2 INSTALLATION OF SHEATHING

### 3.2.1 Fiberboard

Sheathing shall be applied with edges 3 mm 1/8 inch apart at joints, fitted snugly at abutting frames of openings, and nailed or stapled in accordance with the manufacturer's approved instructions. Sheets shall be applied vertically, extended over top and bottom plates, and with all vertical and horizontal joints over supports.

### 3.2.2 Gypsum Board

Sheathing shall be applied with edges in light contact at joints and nailed in accordance with the manufacturer's approved instructions. Sheets 600 mm 2 feet wide shall be applied horizontally with tongued edge up, with vertical joints over supports, and with vertical joints staggered. Sheets 1200 mm 4 feet wide shall be applied vertically, extended over top and bottom plates, and with all vertical and horizontal joints over supports.

### 3.2.3 Plywood and Wood Structural Panels

Sheathing shall be applied with edges 3 mm 1/8 inch apart at side and end joints, and nailed at supported edges at 150 mm 6 inches on center and at intermediate supports 300 mm 12 inches on center unless otherwise shown. Nailing of edges shall be 10 mm 3/8 inch from the edges. Wall sheathing shall extend over top and bottom plates, and if applied horizontally the vertical joints shall be made over supports and staggered. Wall sheathing over which wood shingles are to be applied shall be applied horizontally. Roof sheathing shall be applied with long dimension at right angles to supports, end joints made over supports, and end joints staggered.

### 3.2.4 Wood

Sheathing end joints shall be made over framing members and so alternated that there will be at least two boards between joints on the same support. Each board shall bear on at least three supports. Boards shall be nailed at each support using two nails for boards 150 mm 6 inches and less in width and three nails for boards more than 150 mm 6 inches in width. Roof sheathing shall not be installed where roof decking is installed.

## 3.3 INSTALLATION OF SUBFLOORING

### 3.3.1 Plywood and Wood Structural Panel

Subflooring shall be applied with long dimension at right angles to the supports, with edges 3 mm 1/8 inch apart at side and end joints, and nailed at supported edges 150 mm 6 inches on center and at intermediate supports 300 mm 12 inches on center unless otherwise shown. Subflooring may be installed with adhesive conforming to ASTM D 3498 and nails spaced at 300 mm 12 inches on center unless otherwise shown. Each panel shall have end joints made over supports and end joints staggered. Where finish flooring of different thicknesses is used in adjoining areas, wood strips of the thickness required to bring the finish flooring surfaces into the same plane shall be used under the plywood subfloor.

### 3.3.2 Wood

Subflooring shall be applied diagonally with end joints made over supports. Each board shall bear on at least three supports and shall be nailed at each support using two nails for boards 150 mm 6 inches and less in width

and three nails for boards more than 150 mm 6 inches in width.

### 3.4 INSTALLATION OF UNDERLAYMENT

#### 3.4.1 Hardboard

Underlayment shall be applied with edges 0.8 mm 1/32 inch apart at joints and nailed at edges 150 mm 6 inches on center and at 150 mm 6 inches on center throughout remainder of panel. Nailing at edges shall be 10 mm 3/8 inch from edges. A clearance of 6 mm 1/4 inch shall be provided at walls. Joints of underlayment shall not be located directly over parallel joints of subflooring. Power-driven wire staples of lengths recommended by the underlayment manufacturer may be used in lieu of nails. Any surface roughness at nail heads or joints shall be lightly sanded to blend with the undisturbed surface.

#### 3.4.2 Particleboard

Underlayment shall be applied with edges 0.8 mm 1/32 inch apart at joints and nailed at edges 150 mm 6 inches on center and at 250 mm 10 inches on center throughout remainder of panel. Nailing at edges shall be 10 mm 3/8 inch from edges. A clearance of 6 mm 1/4 inch shall be provided at walls. Joints of underlayment shall not be located directly over parallel joints of subflooring. Power-driven wire staples of lengths recommended by the underlayment manufacturer may be used in lieu of nails. Any surface roughness at nail heads or joints shall be lightly sanded to blend with the undisturbed surface.

#### 3.4.3 Plywood

Underlayment shall be applied with edges 0.8 mm 1/32 inch apart at joints and nailed at edges 150 mm 6 inches on center and at 200 mm 8 inches on center throughout remainder of panel for panels 9 mm 11/32 inch and thicker. Thinner panels shall be nailed at edges 75 mm 3 inches on center and at 150 mm 6 inches on center throughout remainder of panel. Nailing at edges shall be 10 mm 3/8 inch from edges. A clearance of 6 mm 1/4 inch shall be provided at walls. Joints of underlayment shall not be located directly over parallel joints of subflooring. Power-driven wire staples of lengths recommended by the underlayment manufacturer may be used in lieu of nails. When plywood combination subfloor-underlayment is used in lieu of separate layers, it shall be installed as specified for plywood subfloor, except all joints shall be made over supports with edge and joints spaced 3 mm 1/8 inch apart. When plywood combination subfloor-underlayment is tongued and grooved, only end joints shall require support. Tongued and grooved combination subfloor-underlayment shall be applied with joints spaced 3 mm 1/8 inch apart. Any surface roughness at nail heads or joints shall be lightly sanded to blend with the undisturbed surface.

### 3.5 INSTALLATION OF SHEAR WALLS

Plywood or wood structural panels shall be installed with the long dimension parallel or perpendicular to the supports. Blocking shall be provided behind edges not located over supports. Shear wall construction, nailing, and top and bottom anchorage shall be as shown.

### 3.6 INSTALLATION OF MISCELLANEOUS WOOD MEMBERS

#### 3.6.1 Bridging

Wood bridging shall have ends accurately bevel-cut to afford firm contact and shall be nailed at each end with two nails. Metal bridging shall be installed as recommended by the manufacturer. The lower ends of bridging shall be driven up tight and secured after subflooring or roof sheathing has been laid and partition framing installed.

### 3.6.2 Corner Bracing

Corner bracing shall be installed when required by type of sheathing used or when siding, other than panel siding, is applied directly to studs. Corner bracing shall be let into the exterior surfaces of the studs at an angle of approximately 45 degrees, shall extend completely over wall plates, and shall be secured at each bearing with two nails.

### 3.6.3 Blocking

Blocking shall be provided as necessary for application of siding, sheathing, subflooring, wallboard, and other materials or building items, and to provide firestopping. Blocking for firestopping shall ensure a maximum dimension of 2400 mm 8 feet for any concealed space. Blocking shall be cut to fit between framing members and rigidly nailed thereto.

### 3.6.4 Nailers and Nailing Strips

Nailers and nailing strips shall be provided as necessary for the attachment of finish materials. Nailers used in conjunction with roof deck installation shall be installed flush with the roof deck system. Stacked nailers shall be assembled with spikes or nails spaced not more than 450 mm 18 inches on center and staggered. Beginning and ending nails shall not be more than 150 mm 6 inches for nailer end. Ends of stacked nailers shall be offset approximately 300 mm 12 inches in long runs and alternated at corners. Anchors shall extend through the entire thickness of the nailer. Strips shall be run in lengths as long as practicable, butt jointed, cut into wood framing members when necessary, and rigidly secured in place. Nailers and nailer installation for Factory Mutual wind uplift rated roof systems specified in other Sections of these specifications shall conform to the recommendations contained in FM LPD 1-49.

### 3.6.5 Wood Grounds

Wood grounds shall be provided as necessary for attachment of trim, finish, and other work to plaster. Grounds shall be run in lengths as long as practicable, butt jointed, and rigidly secured in place.

### 3.6.6 Furring Strips

Furring strips shall be provided at the locations shown. Furring strips shall be installed at 400 mm 16 inches on center unless otherwise shown, run in lengths as long as practicable, butt jointed and rigidly secured in place.

### 3.6.7 Rough Bucks and Frames

Rough bucks shall be set straight, true, and plumb, and secured with anchors near top and bottom of each wood member and at intermediate intervals of not more than 900 mm 3 feet. Anchors for concrete shall be expansion bolts, and anchors for masonry shall be 5 x 32 mm (3/16 x 1-1/4 inch) 3/16 x 1-1/4 inch steel straps extending not less than 200 mm 8 inches into the masonry and turned down 50 mm 2 inches into the masonry.

### 3.6.8 Wood Bumpers

Wood bumpers shall be bored, countersunk and securely bolted in place.

### 3.6.9 Sill Plates

Sill plates shall be set level and square and anchor bolted at not more than 1800 mm 6 feet on centers and not more than 300 mm 12 inches from end of each piece. A minimum of two anchors shall be used for each piece.

## 3.7 INSTALLATION OF TIMBER CONNECTORS

Installation of timber connectors shall conform to applicable requirements of AF&PA T01.

## 3.8 INSTALLATION OF INSULATION

Insulation shall be installed after construction has advanced to a point that the installed insulation will not be damaged by remaining work. For thermal insulation the actual installed thickness shall provide the thermal resistance R-values shown. For acoustical insulation the installed thickness shall be as shown. Insulation shall be installed on the weather side of such items as electrical boxes and water lines. Unless otherwise specified, installation shall be in accordance with the manufacturer's recommendation.

## 3.9 INSTALLATION OF VAPOR RETARDER

Vapor retarder shall be applied to provide a continuous barrier at window and door frames, and at all penetrations such as electrical outlets and switches, plumbing connections, and utility service penetrations. Joints in the vapor retarder shall be lapped and sealed according to the manufacturer's recommendations.

## 3.10 INSTALLATION OF AIR INFILTRATION BARRIER

Air infiltration barrier shall be installed in accordance with the manufacturer's recommendations.

TABLE I. SPECIES AND GRADE

Subflooring, Roof Sheathing, Wall Sheathing, Furring

Grading Rules	Species	Const Standard	No. 2 Comm	No. 2 Board Comm	No. 3 Comm
NHLA Rules	Cypress			X	
NELMA Grading Rules	Northern White Cedar				X
	Eastern White Pine	X			
	Northern Pine	X			
	Balsam Fir				X
	Eastern Hemlock- Tamarack				X

TABLE I. SPECIES AND GRADE

## Subflooring, Roof Sheathing, Wall Sheathing, Furring

Grading Rules	Species	Const Standard	No. 2 Comm	No. 2 Board Comm	No. 3 Comm
CRA RIS-01-SS	Redwood		X		
SCMA Specs	Cypress			X	
SPIB Rules	Southern Pine		X		
WCLIB Std 17	Douglas Fir-Larch	X			
	Hem-Fir	X			
	Sitka Spruce	X			
	Mountain Hemlock	X			
	Western Cedar	X			
WWPA Grading Rules	Douglas Fir-Larch	X			
	Hem-Fir	X			
	Idaho White Pine	X			
	Lodgepole Pine			X	
	Ponderosa Pine			X	
	Sugar Pine			X	
	Englemann Spruce			X	
	Douglas Fir South			X	
	Mountain Hemlock			X	
	Subalpine Fir			X	
	Western Cedar			X	

TABLE II. SPECIES AND GRADE

## Wood Bumpers

Grading Rules	Species	No. 1	No. 2
NHLA Rules	Red Oak	X	
NELMA Grading Rules	Northern Pine		X
	Eastern Hemlock-Tamarack		X
SPIB Rules	Southern Pine	X	
WCLIB Std 17	Douglas Fir-Larch		X
	Hem-Fir		X

TABLE II. SPECIES AND GRADE

Wood Bumpers			
Grading Rules	Species	No. 1	No. 2
WWPA Grading Rules			
	Douglas Fir-Larch		X
	Hem-Fir		X
	Douglas Fir-South		X

-- End of Section --



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DIVISION 06 - WOODS & PLASTICS

SECTION 06200

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## SECTION 06200

## FINISH CARPENTRY

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.6 (1998) Hardboard Siding

## APA-THE ENGINEERED WOOD ASSOCIATION (APA)

APA E445 (1994; Rev Oct 1997) Performance Standards and Policies for Structural-Use Panels

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1435 (1994) Outdoor Weathering of Plastics

ASTM D 2898 (1996) Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing

ASTM D 3679 (1996) Rigid Poly(Vinyl Chloride) (PVC) Siding

ASTM F 547 (1977; R 1990) Definitions of Terms Relating to Nails for Use with Wood and Wood-Base Materials

## AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C9 (1997) Plywood - Preservative Treatment by Pressure Processes

AWPA C20 (1996) Structural Lumber Fire-Retardant Pressure Treatment

AWPA C27 (1996) Plywood - Fire-Retardant Pressure Treatment

AWPA M4 (1996) Standard for the Care of Preservative-Treated Wood Products

AWPA P5 (1997) Standards for Waterborne Preservatives

## ARCHITECTURAL WOODWORK INSTITUTE (AWI)

AWI Qual Stds (1994) Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program

CALIFORNIA REDWOOD ASSOCIATION (CRA)

CRA RIS-01-SS (1997) Standard Specifications for Grades of California Redwood Lumber

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1 (1996) Voluntary Product Standard - Construction and Industrial Plywood

DOC PS 2 (1992) Performance Standard for Wood-based Structural-Use Panels

NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION (NELMA)

NELMA Grading Rules (1997) Standard Grading Rules for Northeastern Lumber

SOUTHERN CYPRESS MANUFACTURER'S ASSOCIATION (SCMA)

SCMA Specs (1986; Supple No. 1, Aug 1993) Standard Specifications for Grades of Southern Cypress

SOUTHERN PINE INSPECTION BUREAU (SPIB)

SPIB Rules (1994;Supple 8 thru 11) Standard Grading Rules for Southern Pine Lumber

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

WCLIB Std 17 (1996; Supples VII(A-E), VIII(A-C)) Grading Rules For West Coast Lumber

WESTERN WOOD PRODUCTS ASSOCIATION (WWPA)

WWPA Grading Rules (1995; Supple Nos. 1 thru 5)Western Lumber Grading Rules 95

WOOD MOULDING AND MILLWORK PRODUCERS ASSOCIATION (WMPMA)

WMPMA WM 6 (1987) Industry Standard for Non-Pressure Treating of Wood Millwork

## 1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Siding; GA. Epoxy-Aggregate Panels; GA.

Manufacturer's printed data, showing texture, density, catalog cuts, and installation instructions.

Wood Items, Siding, and Trim; GA.

Manufacturer's printed data indicating the usage of engineered or recycled wood products, and environmentally safe preservatives.

#### SD-04 Drawings

Finish Carpentry; GA.

Drawings showing fabricated items and special mill and woodwork items. Drawings shall indicate materials and details of construction, methods of fastening, erection, and installation.

#### SD-14 Samples

Siding; FIO. Wood Shingles; FIO. Moldings; FIO. Fascias and Trim; FIO.

Samples shall be of sufficient size to show patterns, color ranges, and types, as applicable, of the material proposed to be used.

### 1.3 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition, stored off ground in fully covered, well-ventilated areas, and protected from extreme changes in temperature and humidity.

## PART 2 PRODUCTS

### 2.1 WOOD ITEMS, SIDING, AND TRIM

The Contractor shall furnish products which optimize design by reducing the amount of wood used (engineered wood), or recycled wood products, and preservatives without arsenic or chromium when the products and methods are competitive in price or directed by the Contracting Officer.

#### 2.1.1 Grading and Marking

Materials shall bear the grademark, stamp or other identifying marks indicating grades of material and rules or standards under which produced. Such identifying marks on a material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification. The inspection agency for lumber shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used. Except for plywood, wood structural panels, and lumber, bundle marking will be permitted in lieu of marking each individual piece. Surfaces that are to be architecturally exposed to view shall not bear grademarks, stamps, or other types of identifying marks.

#### 2.1.2 Sizes and Patterns

Lumber sizes and patterns shall conform to rules or standards under which produced. Unless otherwise specified, lumber shall be surfaced on four sides. Sizes and patterns for materials other than lumber shall conform to

requirements of the rules or standards under which produced. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

### 2.1.3 Moisture Content

The maximum moisture content of untreated trim and wood siding shall be 15 percent at the time of delivery to the jobsite and when installed. Moisture content of all other material shall be in accordance with the standard under which the product is produced.

### 2.1.4 Preservative Treatment

#### 2.1.4.1 Plywood

Plywood shall be treated in accordance with AWPA C9 with waterborne preservatives listed in AWPA P5 to a retention level as follows:

- a. 4 kg per cubic meter (0.25 pcf) 0.25 pcf intended for above ground use.
- b. 6.4 kg per cubic meter (0.4 pcf) 0.4 pcf intended for ground contact and fresh water use.

#### 2.1.4.2 Exterior Wood Molding and Millwork

Exterior wood molding and millwork within 455 mm 18 inches of soil, in contact with water or concrete shall be preservative-treated in accordance with WMPA WM 6. Exposed areas of treated wood that are cut or drilled after treatment shall receive a field treatment in accordance with AWPA M4.

Items of all-heart material of cedar, cypress, or redwood will not require preservative treatment, except when in direct contact with soil.

### 2.1.5 Fire-Retardant Treatment

Fire-retardant treated lumber shall be pressure treated in accordance with AWPA C20. Fire-retardant treated plywood shall be pressure treated in accordance with AWPA C27. Material use shall be defined in AWPA C20 and AWPA C27 for Interior Type A and B and Exterior Type. Treatment and performance inspection shall be by a qualified independent testing agency that establishes performance ratings. Each piece or bundle of treated material shall bear identification of the testing agency to indicate performance with such rating. Treated materials to be exposed to rain wetting shall be subjected to an accelerated weathering technique in accordance with ASTM D 2898, Method A, prior to being tested for compliance with AWPA C20 or AWPA C27. Items to be treated are as required by the Task Order.

### 2.1.6 Siding

Horizontal siding shall be hardboard, plywood, wood structural panel, wood or vinyl. Panel siding shall be hardboard, wood structural panel, or plywood.

#### 2.1.6.1 Horizontal Hardboard Siding

Horizontal hardboard siding shall be made from basic hardboard specified in AHA A135.6, factory primed face and longitudinal edges, factory applied

back, lap type, maximum practicable lengths, width and thickness as required by the Task Order. Smooth, embossed or textured face as required by the Task Order.

#### 2.1.6.2 Horizontal Plywood Siding

Horizontal plywood siding shall conform to DOC PS 1, exterior, medium-density overlay lap type, maximum practicable lengths, width and thickness as required by the Task Order. Smooth, rough-sawn texture or embossed face as required by the Task Order.

#### 2.1.6.3 Wood Siding

Wood siding shall be of the species and grades listed in TABLE I at the end of this section. Siding shall be horizontal bevel type, minimum 5 mm 3/16 inch thin edge by minimum 11 mm 7/16 inch thick edge, horizontal plain lap type or horizontal drop type or vertical board, tongue and groove or shiplap on long edges, vertical board and batten type, 25 mm 1 inch thick, maximum practicable lengths, smooth or rough-sawn texture face as required by the Task Order.

#### 2.1.6.4 Vinyl Siding

Vinyl siding shall be manufactured to withstand outdoor weathering in accordance with ASTM D 1435 and shall meet the physical requirements of ASTM D 3679. The minimum thickness of the siding shall be 0.9 mm (0.035 inches). 0.035 inches. Horizontal and vertical siding panels shall be between 200 and 250 mm 8 and 10 inches in width depending on the configuration of the panel. Panels shall have a uniform color on the surface and throughout the thickness of the panel. Panels shall have a wood grain, smooth or matte surface as required by the Task Order.

#### 2.1.6.5 Panel Hardboard Siding

Panel hardboard siding shall be made from basic hardboard specified in AHA A135.6, factory primed face, factory applied back, 1200 mm 4 feet wide, maximum practicable lengths, 10 mm (3/8 inch) 3/8 inch or 11 mm (7/16 inch) 7/16 inch thick, smooth or embossed face, and grooved as selected from manufacturer's standard patterns as required by the Task Order.

#### 2.1.6.6 Panel Plywood Siding

Panel plywood siding shall conform to DOC PS 1, exterior medium-density overlay, 1200 mm 4 feet wide, maximum practicable lengths, span rating of 400 mm on centers, 16 inch on centers, smooth, embossed, rough-sawn texture or striated face, and grooved as selected from manufacturer's standard patterns as required by the Task Order.

#### 2.1.6.7 Horizontal Rated Siding

Rated horizontal siding shall be qualified under APA E445, exterior type medium-density overlay, lap types, maximum practicable lengths, smooth, embossed or rough-sawn texture face, width and thickness, as required by the Task Order.

#### 2.1.6.8 Panel Rated Siding

Rated panel siding shall be qualified under APA E445, exterior type, medium-density overlay 1200 mm 4 feet wide, maximum practicable lengths,

span rated at 400 mm 16 inch on centers, smooth, embossed or striated face, and grooves as selected from manufacturer's standard patterns and as required by the Task Order.

#### 2.1.6.9 Wood Structural Panels

Wood Structural Panels shall conform to DOC PS 2, exterior, exposure 1 or 2, single-faced or double-faced, 1200 mm 4 feet wide, maximum practicable lengths, selected from manufacturer's standard patterns to satisfy the wind load for the specified span as required by the Task Order.

#### 2.1.7 Epoxy-Aggregate Panels

Prefinished epoxy-aggregate panels shall consist of an asbestos-free cement board base sheet with a factory applied surface of epoxy resins and decorative natural stone chips. Factory applied finish shall be a minimum of 0.5 mm 20 mils of 100 percent solids, two-component epoxy resin-based coating followed by an application of inert aggregate. Stone color shall be selected from manufacturer's standard colors. Cement board base sheet shall be a minimum of 6 mm 1/4 inch thick. Finished panels shall be dimensionally stable. Water absorption on the surfaced side shall not exceed 0.20 percent after 24 hours of submergence in water. Accessories shall be manufacturer's standard extruded matching color aluminum moldings.

Moldings shall be provided for meeting strips, end caps, inside corners, or outside corners. Fasteners shall be noncorrosive, self-tapping screw type and finished to match the color of stone. Caulking compound shall be color compatible, low modulus silicone or urethane type.

#### 2.1.8 Soffits

##### 2.1.8.1 Hardboard and Plywood

Hardboard and plywood soffits shall be siding grade hardboard, 10 or 11 mm (3/8 or 7/16 inch) 3/8 or 7/16 inch thick; plywood, DOC PS 1, exterior type, Grade A-C, plywood panel siding or rated siding, 9 mm (11/32 inch) 11/32 inch thick for 600 mm 24 inch on centers maximum span with all edges supported.

##### 2.1.8.2 Vinyl

Vinyl soffits shall be manufactured to withstand outdoor weathering in accordance with ASTM D 1435 and shall meet the physical requirements of ASTM D 3679. Panels shall be solid or vented and shall have smooth or matte surface as required by the Task Order.

#### 2.1.9 Fascias and Trim

##### 2.1.9.1 Wood

Fascias and trim, including exterior door and window casing, shall be species and grade listed in TABLE I at the end of this section. Sizes shall be as indicated. Metal corners may be furnished in lieu of wood cornerboards for horizontal siding; and if furnished, shall be galvanized steel and primed or aluminum and primed.

##### 2.1.9.2 Vinyl

Vinyl trim, including exterior door and window casing and moldings, shall meet the pertinent requirements specified for vinyl siding and soffits.



#### 2.1.10 Moldings

Moldings shall be of the pattern indicated and shall be of a grade compatible with the finish specified.

#### 2.1.11 Wood Shingles

Wood shingles shall be No. 1 Grade, Red Cedar, Tidewater Red Cypress or California Redwood in accordance with applicable grading rules under which it is produced, random widths, 400 mm 16 inches length, dip-stained at factory in color selected from manufacturer's standards colors.

#### 2.1.12 Woodwork Items

##### 2.1.12.1 Bulletin Boards

Bulletin boards shall have a hardwood or aluminum frame, 6 mm (1/4 inch) 1/4 inch thick plywood or hardboard back; and a 6 mm (1/4 inch) 1/4 inch thick, dense, smooth faced corkboard face securely cemented to the back.

##### 2.1.12.2 Chalkboards

Chalkboards shall have a hardwood or aluminum frame and 6 mm (1/4 inch) 1/4 inch thick writing surface of selected chalkboard slate with surface ground to a true plane, cast acrylic plastic plate glass with color fused to surface or porcelain enamel laminated to plywood. Color shall be black.

##### 2.1.12.3 Utility Shelving

Utility shelving shall be a suitable species equal to or exceeding requirements of No. 3 Common white fir under WWPA Grading Rules, 25 mm 1 inch thick; or plywood, interior type, Grade A-B, 13 mm (1/2 inch) 1/2 inch thick, any species group.

##### 2.1.12.4 Workbench

Workbench shall have a work surface of 6 mm (1/4 inch) 1/4 inch solid core plywood with sanded face or 1.3 mm (18 gauge) 18 gauge steel with gray enamel finish over 50 mm 2 inch thick lumber backing. Base shall be 2 mm (14 gauge) 14 gauge steel with legs adjustable to 25 mm 1 inch increments to adjust the work surface from 760 to 915 mm. 30 to 36 inches.

#### 2.2 NAILS

Nails shall be the size and type best suited for the purpose and shall conform to ASTM F 547. Nails shall be hot-dip galvanized or aluminum when used on exterior work. For siding, length of nails shall be sufficient to extend 40 mm 1-1/2 inches into supports, including wood sheathing over framing. Screws for use where nailing is impractical shall be size best suited for purpose.

### PART 3 EXECUTION

#### 3.1 GENERAL

##### 3.1.1 Installation of Siding

Siding shall be accurately fitted and positioned without springing or

otherwise forcing siding in place. Siding to have a stain finish shall have nails set and stopped with nonstaining putty to match finished siding. Siding to have a paint finish shall have nails driven flush.

### 3.1.2 Horizontal Siding

End joints shall be made over framing members and be so alternated that at least two boards will be between joints on the same support. Shorter pieces shall be uniformly distributed throughout each area. Starter strips shall be provided as necessary to establish proper slant for siding. Ends of siding shall be predrilled if necessary to prevent splitting when nailed. Horizontal bevel or plain lap siding shall be overlapped and nailed into each support in accordance with approved recommendations of the siding manufacturer. Horizontal drop siding shall have each course fully worked into the top edge of the previous course, and shall be nailed into each support with two nails, one near the lower edge to clear top of previous course, and one just above mid-height of course. Vinyl siding shall be fastened to a starter strip at the locking hem. Each subsequent course shall be interlocked at the locking hem to the adjoining panel and nailed to the substrate on the nailing flange. Nails shall be placed at the center of the slots on the nailing flange, and loosely nailed to allow movement in the panel.

### 3.1.3 Vertical Board Siding

Siding shall be applied with horizontal joints only at locations indicated. Each board shall be fully worked into the edge of previous course, and shall be nailed into supports at 600 mm 24 inches on centers with two nails, one blind if possible at or near joint with the previous board, and one just outside the board centerline.

### 3.1.4 Vertical Board and Batten Siding

Siding shall be applied with horizontal joints only at locations indicated. Each board shall be installed with 13 mm 1/2 inch space between it and the previous board, and nailed at the center of the board and into supports at 600 mm 24 inches on center. Battens shall be centered over the space between boards and nailed down the center at 400 mm 16 inches on center.

### 3.1.5 Panel Siding

Panels shall be applied with edges at joints spaced in accordance with manufacturer's recommendations. Shiplapped edges or square edges covered with battens shall be primed for paint finish, or sealed for stain finish, and all edges shall be backed with framing members. Panels shall be nailed at edges at 150 mm 6 inches on center and at intermediate supports at 300 mm 12 inches on center unless otherwise shown. Nailing at edges shall be 10 mm 3/8 inch from edges. For shiplap joints, nailing shall be 10 mm 3/8 inch from the visible joint and at a location to penetrate lap with previous panel. When panel siding is part of an engineered shear wall or used as wall-bracing, shiplap joints shall be nailed to supports with double rows of nails. Battens shall be spaced at 400 mm 16 inches on centers and nailed down the center at 600 mm 24 inches on center.

### 3.1.6 Epoxy-Aggregate Coated Panels

Panels shall be installed where shown. Installation shall be as recommended by the manufacturer of the panels.

### 3.2 SOFFITS

#### 3.2.1 Wood

Panels shall be applied with edges at joints spaced in accordance with manufacturer's instructions and with all edges backed with framing members. Panels shall be nailed 10 mm 3/8 inch from edges at 150 mm 6 inches on center and at intermediate supports at 300 mm 12 inches on center. Panels shall be installed using the maximum practical lengths.

#### 3.2.2 Vinyl

Vinyl soffits shall rest in a "j" channel at each end of the soffit panel. Each panel shall be interlocked at the locking hem and nailed to a support at the nailing flange. Nails shall be placed at the center of the slots on the nailing flange, and loosely nailed to allow movement in the panel.

### 3.3 FASCIAS AND EXTERIOR TRIM

Exposed surfaces and square edges shall be machine sanded, caulked, and constructed to exclude water. Joints of built-up items, in addition to nailing, shall be glued as necessary for weather-resistant construction. End joints in built-up members shall be well distributed. Joints in flat work shall be shouldered. Backs of wide-faced miters shall be held together with metal rings and glue. Fascias and other flat members shall be in maximum practicable lengths. Cornices shall be braced, blocked, and rigidly anchored for support and protection of vertical joints.

### 3.4 MOLDING AND INTERIOR TRIM

Molding and interior trim shall be installed straight, plumb, level and with closely fitted joints. Exposed surfaces shall be machine sanded at the mill. Molded work shall be coped at returns and interior angles and mitered at external corners. Intersections of flatwork shall be shouldered to ease any inherent changes in plane. Window and door trim shall be provided in single lengths. Blind nailing shall be used to the extent practicable, and face nailing shall be set and stopped with a nonstaining putty to match the finish applied. Screws shall be used for attachment to metal; setting and stopping of screws shall be of the same quality as required where nails are used.

### 3.5 FINISH STAIRWORK

Finish stairwork shall conform to AWI Qual Stds, Premium Grade for transparent, Custom Grade for opaque finish. Stairwork shall be erected to form a strong, rigid structure without squeaks or vibrations. Railings shall be secured with concealed fasteners. Wall rails shall be supported on metal brackets spaced near ends and not over 1.5 m 5 feet on centers.

### 3.6 WOOD SHINGLES

Wood shingles shall be applied by single-coursing method and with a weather exposure of as required by the Task Order. Each shingle shall be nailed with two nails 25 mm 1 inch above butt line of the next course, except shingles more than 200 mm 8 inches in width shall be nailed with three nails. Starter course shall be doubled, and vertical joints shall be offset from vertical joints of the previous course. Corners shall be mitered over flashing or abutted to a cedar or redwood strip at the corner as indicated.

### 3.7 WOODWORK ITEMS

#### 3.7.1 Bulletin Boards and Chalkboards

Items shall be installed in accordance with the manufacturer's recommendation.

#### 3.7.2 Shelving

Shelving shall be anchored to supporting construction. Unless otherwise indicated, shelves shall be supported by wall-supported brackets not more than 600 mm 24 inches on center or as required to limit deflection to 6 mm 1/4 inch between supports with a load of 525 N per meter. 35 lb per lineal foot. Adjustable shelf hardware shall be steel standards, channel shaped, with 25 mm 1 inch adjustment slots and brackets designed for attachment to standards.

#### 3.7.3 Clothes Hanger Rods

Rods shall be provided where indicated and in all closets having hook strips. Rods shall be hardwood 38 mm (1-1/2 inches) 1-1/2 inches in diameter. Rods shall be set parallel with the front edges of the shelving, and shall be supported at each end by suitable sockets, and by intermediate brackets spaced at not more than 1200 mm 4 foot centers.

#### 3.7.4 Workbenches

Items shall be anchored in place as indicated.

TABLE I. SPECIES AND GRADE TABLES

Grading Rules	Species	Choice	Clear	C Select	C & Better
NELMA Grading Rules		Eastern Cedar			X
	Eastern Hemlock		X		
	Tamarack				X
	Eastern W. Pine				X
	Northern Pine				X
	Eastern Spruce			X	
	Balsam Fir		X		
CRA RIS-01-SS		Redwood			X
SCMA Specs		Cypress			X
SPIB Rules		Southern Pine			
		X			
WCLIB Std 17		Douglas Fir			
		X			
	Larch				X
	Hemlock Fir				X
	Mountain Hemlock				X
	Sitka Spruce				X
WWPA Grading Rules		Douglas Fir			
	X				
	Larch				X
	Hemlock Fir		X		
	Mountain Hemlock				X
	Western Larch		X		
	Idaho White Pine	X			
	Lodgepole Pine		X		
	Ponderosa Pine		X		
	Sugar Pine		X		
	Englemann Spruce		X		
	Douglas Fir South		X		
	Subalpine Fir		X		

NOTE 1: Western Cedar under WCLIB Std 17 shall be Grade B; and under WWPA Grading Rules, Western Cedar shall be Grade B bevel for siding and Grade A for trim.

NOTE 2: Except as specified in NOTE 3 below, siding and exterior trim shall be any of the species listed above. Interior trim shall be any one of the species listed above and the highest grade of the species for stain or natural finish and one grade below highest grade of species for paint finish.

NOTE 3: Southern Yellow Pine, Douglas Fir, Larch, Western Larch, and Tamarack shall not be used where painting is required and may be used on exterior work only when approved and stained with a preservative type stain.

-- End of Section --